Pease AFB RAB Meeting

05 OCT 2016

Agenda

- April Minutes approval
- Restoration Program Overview - 2016 Fieldwork Activities Snapshot
- PFCs at Pease AFB
- Public Comments
- RAB Operating Procedures

Environmental Restoration Overview

- Environmental Restoration underway since 1980s.
- Provided an overview in the spring.
- Did a site tour in July 2016.
- Tonight – provide an overview of the fieldwork performed this summer.

Pease Restoration Project Team

- **Air Force COR:** David Strainge
- **Air Force BEC:** Peter Forbes

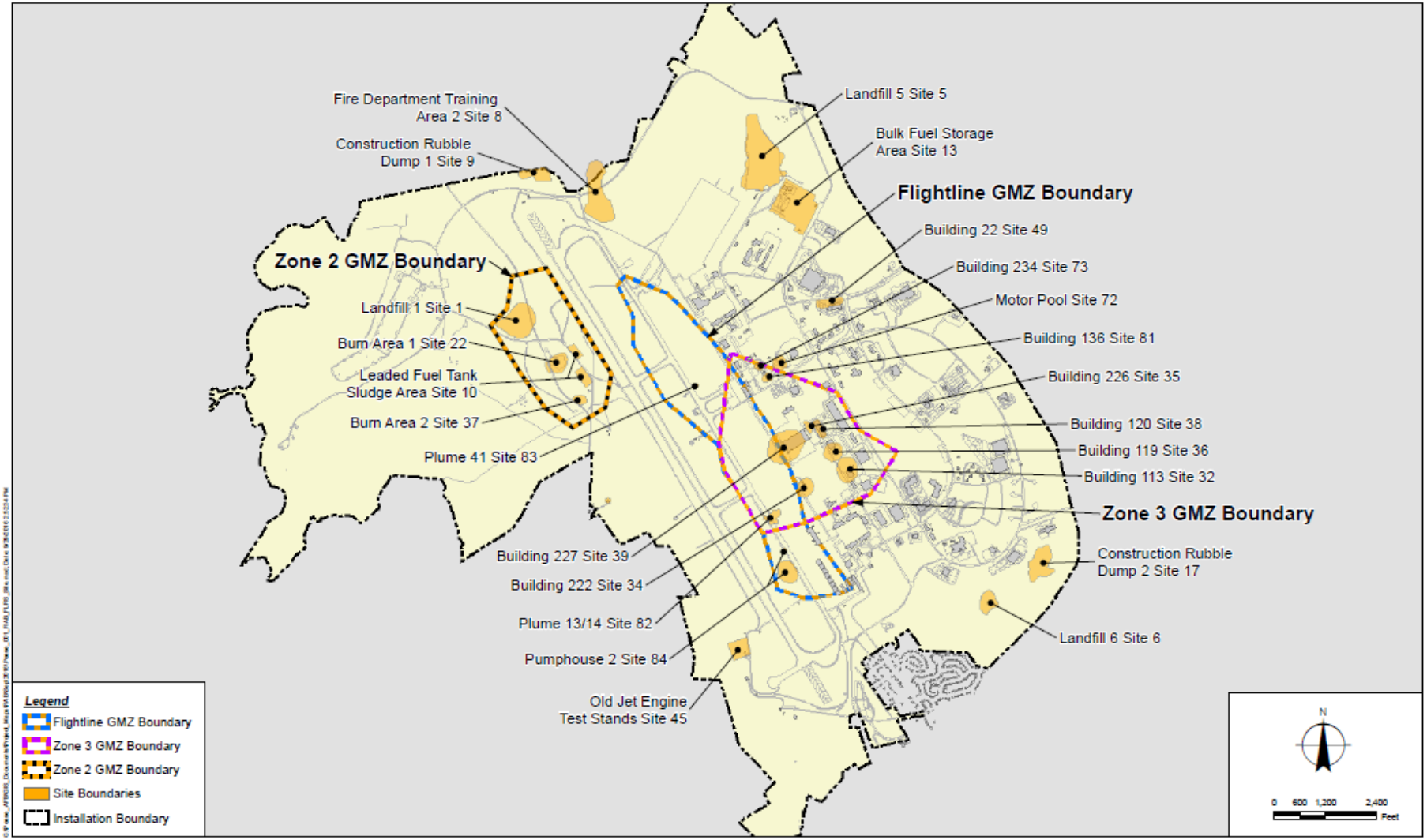
- **EPA RPM:** Mike Daly
- **NHDES PM:** Scott Hilton

- **PDA Point of Contact:** Jared Sheehan

- **CB&I PM:** Mike Quinlan
- **CB&I Field Manager:** Marty Mistretta

Federal Facilities Agreement (1990) – Agreement between AF, EPA and NHDES that establishes procedural framework for investigation and cleanup activities.

Sites Map



Former Pease Air Force Base
Restoration Sites

2016 Restoration Program Snapshot

- **110 Groundwater wells installed**
  - 26 Permanent monitoring and/or injection wells
  - 84 Temporary wells for remedial injections
- **Groundwater treatment at 6 sites**
  - In-situ enhanced bioremediation – bugs eat contamination
  - In-situ chemical oxidation – chemical destruction of contaminants
- **1,907 Samples collected (348 PFCs)**
  - Sediment, surface water, groundwater, soil vapor/indoor air, and soil.
  - Primarily volatile and semi volatile organic compounds, and metals
- **42 Documents prepared (3 PFC docs)**
- **14,778 Man hours to date in 2016 (Excluding subs)**

Groundwater Treatment Summary

Site ID	Contamination	Source	Treatment	Injection Volume (gallons)
Site 32	Chlorinated Solvents (TCE)	Aircraft Maintenance - solvent degreasing	In Situ Enhanced Bioremediation - (EVOS & SDC9)	18,669
Site 49	Chlorinated Solvents (TCE)	Communication Bldg. - solvent degreasing	In Situ Enhanced Bioremediation - (EVOS & SDC9)	33,226
Plume 41	Jet fuel related compounds	Part of Flightline Refueling System	In Situ Enhanced Bioremediation (sulfate)	24,000
Site 22	alkylbenzene group, benzene, naphthalene	Fire Training/Burn Pit	In Situ Chemical Oxidation (H2O2 & persulfate)	55,500
Site 10	benzene	Disposal of Gasoline Sludge	In Situ Enhanced Bioremediation (sulfate)	46,097
Site 36	benzene, naphthalene, chlorobenzenes, and TCE	Jet Engine Accessory Maintenance	In Situ Chemical Oxidation (H2O2 & persulfate)	18,130

- In-situ enhanced bioremediation – bugs eat contamination
- In-situ chemical oxidation – chemical destruction of contaminants

Site 49 – Former Comm Bldg

- **1998** Bldg Demo/Excavation
- **2000** Permeable Reactive Barrier
  - Zero Valent Iron
  - Deep OB and Shallow Bedrock
- **2000 – 2012** Performance Monitoring
- **2013** Phase 1 ISEB Injections
- **2013** Add'l Investigation
  - 12 Wells Installed
  - DNAPL Discovered
  - 26,400 ppb TCE in overburden well
- **2016** Phase 2 ISEB Injections
- **2016 – 2018** Performance Monitoring

Site 49 – Summer 2016 Fieldwork

Injections this summer

Site after injections complete

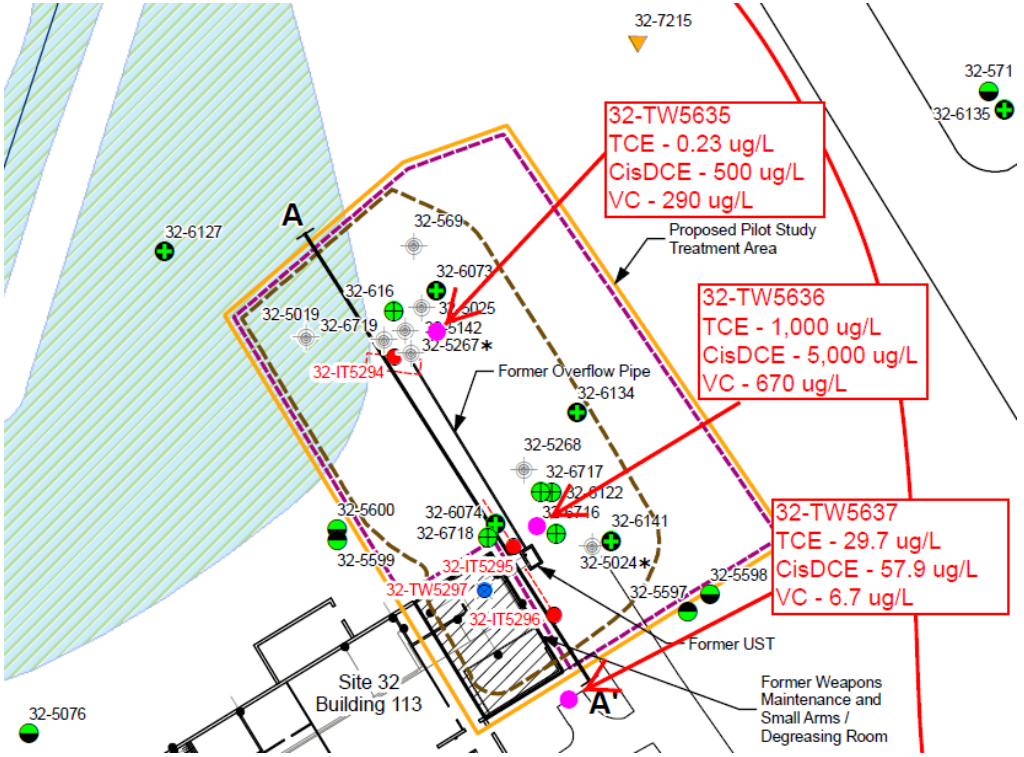
Site 22 Former FTA/Burn Pit

- **1997 – 2000** AS/SVE operation
- **2002** Soil Confirmation
- **2000 – 2012** Monitored Natural Attenuation
- **2013 - 2015 –** Add'l investigations
  - Delineate extent of GW contamination
- **2016** ISCO Injections
- **2016 – 2018** Performance Monitoring

Site 22 ISCO Injections

Site 32 – Bldg. 113

- **1996** Sheet Pile Installation & Groundwater Pump and Treat
- **2013** – Add'l Investigation
  - DNAPL in soil
- **2014** – Soil Excavation
  - Shut down extraction system
- **2015** – Performance Monitoring
- **2016** – ISEB Injections
- **2017 – 2018** Performance Monitoring



Site 32 Fieldwork (2014 & 2016)

Horizontal injection wells – bottom of excavation.

Mixing tanks for injection

Site 39- Bldg 227 Hangar

- 1996 Soil removal near SW corner of bldg.
- 1997 GW Extraction and Treatment
- 2015 GW ISEB Treatment
  - Injection wells installed
  - Shutdown Extraction System
- 2011 – 2016 Vapor Intrusion Investigation
  - Elevated PCE/TCE in subslab
  - One indoor air above screening value in 2013
- 2016 SVE Pilot Study Proposed
  - Address residual soil contamination.
  - Horizontal Well to be installed

Update on PFCs at Pease

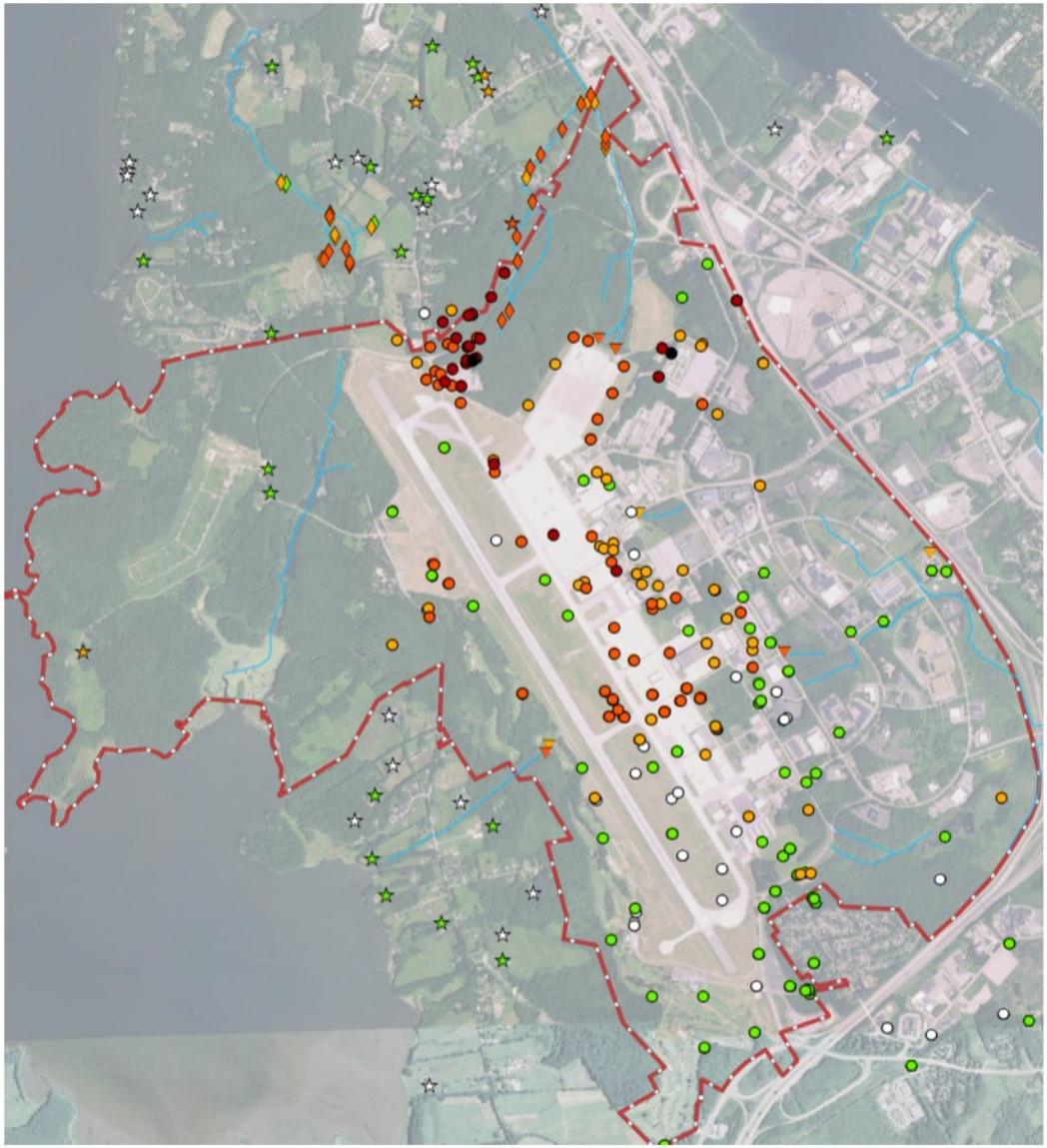
- **April 2016 RAB Briefing**
  - **Perfluorinated Compounds (PFCs) are man-made chemicals resistant to heat, oil, stains, grease and water**
  - **Present in wide variety of residential, commercial and industrial products**
  - **PFCs were used in firefighting foams starting in the 1970s**
  - **2009 EPA Provisional Health Advisory:**
    - 400 parts per trillion for Perfluorooctanoic acid (PFOA)
    - 200 parts per trillion for Perfluorooctanesulfonic Acid (PFOS)
  - **In 2014, PFCs were discovered at Pease at levels above EPA's Provisional Health Advisory at the Haven Well**
  - **City of Portsmouth took Haven Well off-line (May 2014)**
  - **Air Force initiated an investigative program to better understand the location and extent of PFC problem at Pease**
  - **Pease Fire Training Area (FTA) groundwater treatment system was modified and re-activated in Fall 2015**

Update on PFCs at Pease

- **May 2016, EPA issued new <u>lifetime</u> health advisory for drinking water:**
  - **70 parts per trillion for PFOS, PFOA, and PFOS/PFOA combined**
- **May 2016, NHDES issued Ambient Groundwater Quality Standards for groundwater:**
  - **70 parts per trillion for PFOS, PFOA, and PFOS/PFOA combined**

Update on PFCs at Pease

PFOS + PFOA relative to new Health Advisory/Ambient Groundwater Standard



SYMBOL KEY

Groundwater PFOS+PFOA in µg/L:	Surface Water PFOS+PFOA in µg/L:	Pore Water PFOS+PFOA in µg/L:
ND	ND	ND
>ND to < 0.07	>ND to < 0.07	>ND to < 0.07
0.07 to < 0.7	0.07 to < 0.7	0.07 to < 0.7
0.7 to < 7	0.7 to < 7	0.7 to < 7
7 to < 70		
> 70		

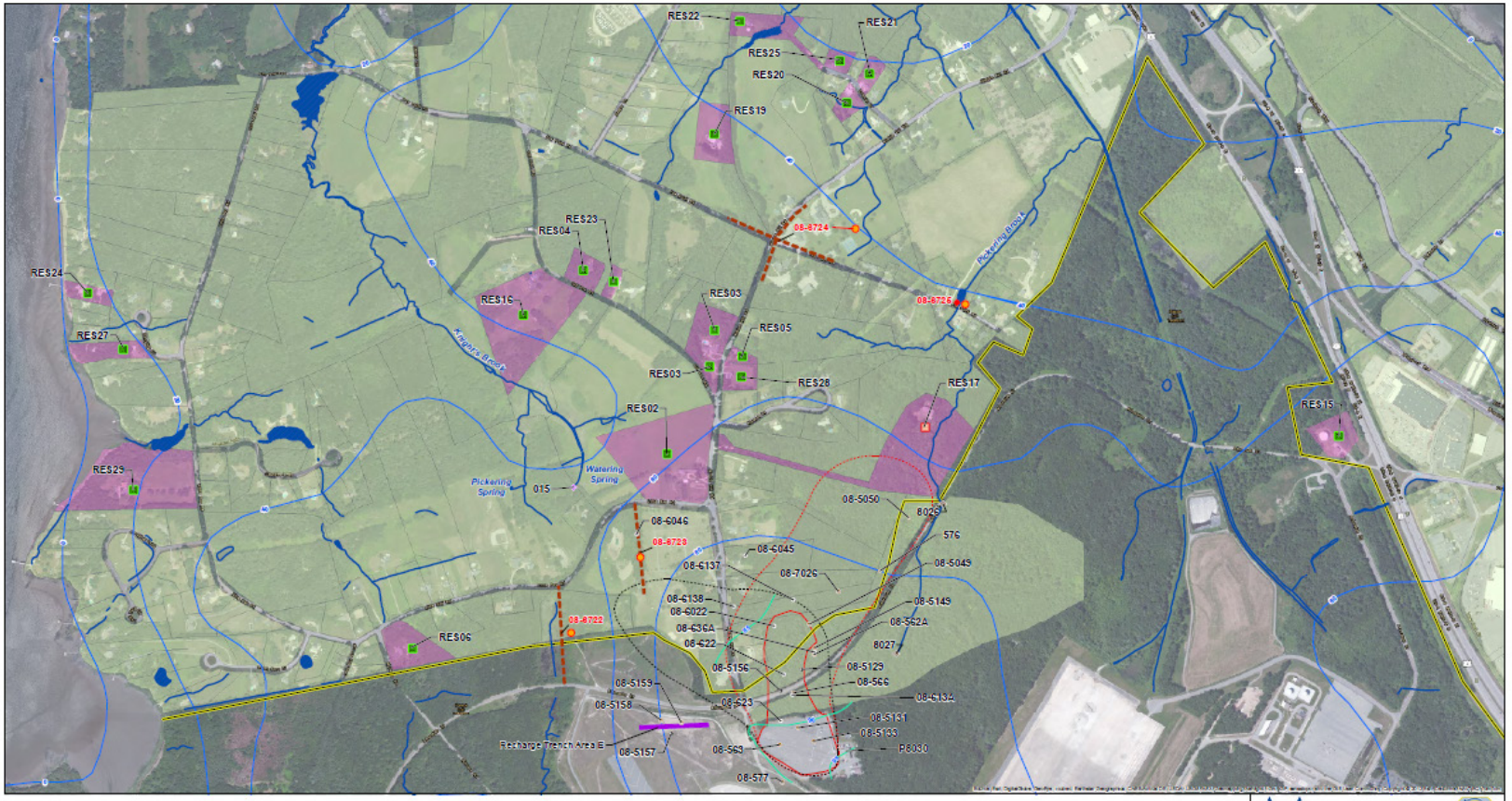
Residential Wells PFOS+PFOA in µg/L:	Potable Water/Distribution PFOS+PFOA in µg/L:
ND	ND
>ND to < 0.07	>ND to < 0.07
0.07 to < 0.7	Surface Water Bodies
0.7 to < 7	Installation Boundary

Update on PFCs at Pease

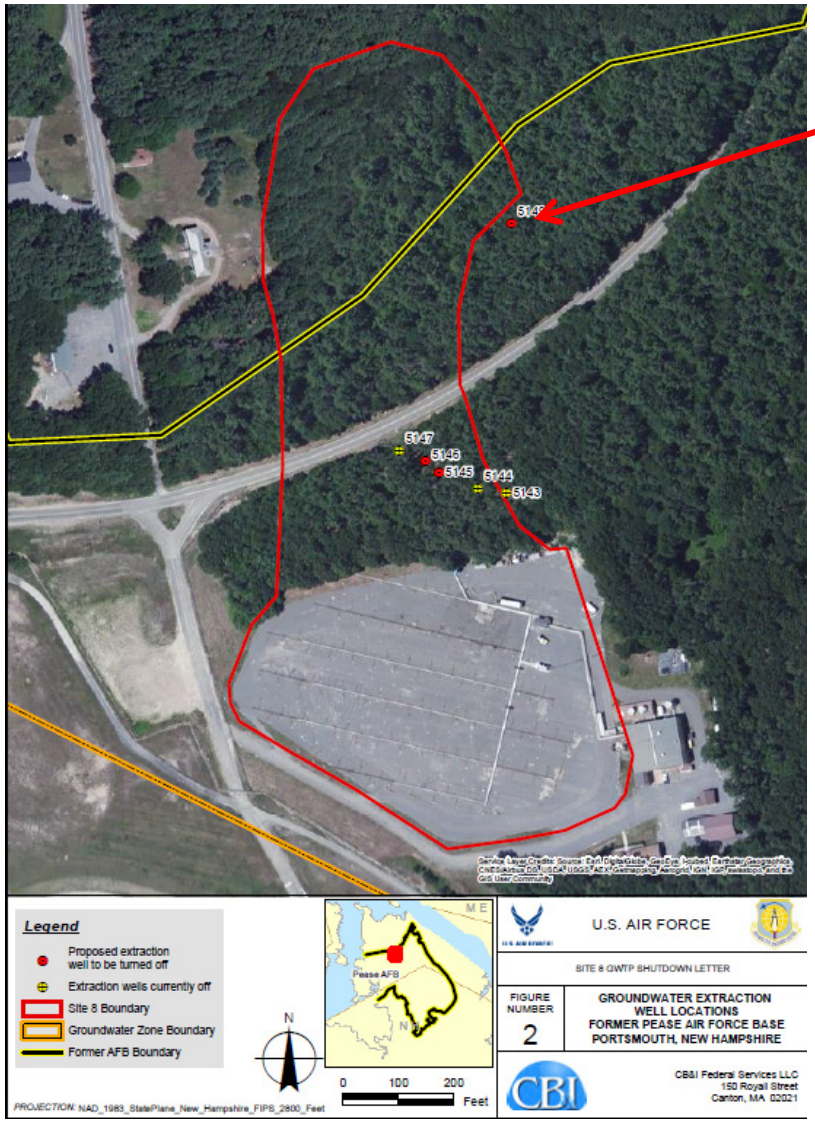
- **City of Portsmouth has initiated PFC treatment on the Smith and Harrison Wells**
  - **Funded by the Air Force**
  - **Using granular activated carbon**
  - **Initial operating data will be used to construct a new treatment plant beginning in Fall 2017 that may eventually treat the Haven Well also**
- **Air Force has continued to sample the Smith, Harrison, Portsmouth and Collins Wells**
  - **114 sampling events and 737 samples (supply wells, sentry wells and distribution points)**
  - **Concentrations are very stable – no changes**
  - **Data posted to City website**

City of Portsmouth Photo

PFC Investigation and Response Actions



Current Extraction Wells



Well 8-5149

Site 8 GWTS Optimization

- **Added carbon vessel**
  - 3 vessels in series
  - To better manage breakthrough and prevent concentrations above the HA in effluent
  - PFCs harder to treat than hydrocarbons

- **Treatability Study** – coconut based carbon vs. coal based carbon
  - Coal based F400 is 2x more effective but costs 2x as much

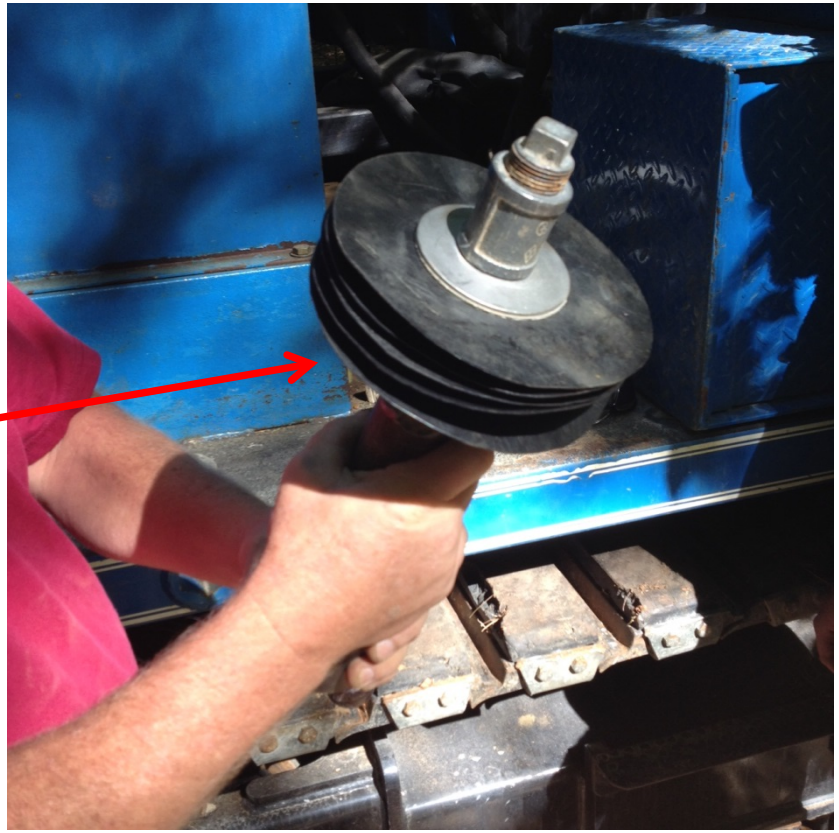
- **Coconut in lead vessel**
  - Quick breakthrough – biofouling

- **Change out lead & mid vessel**
  - Move polishing vessel to middle

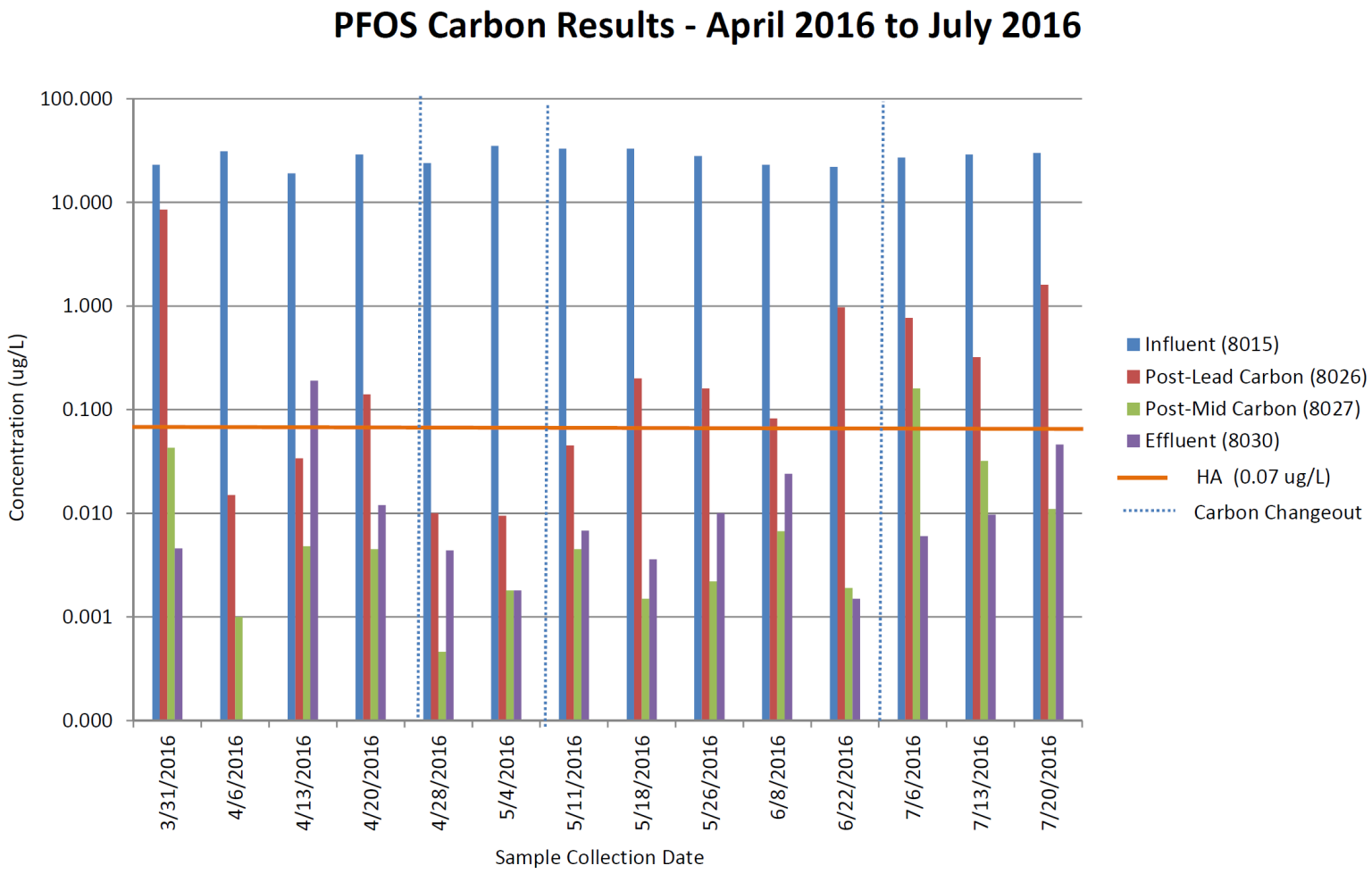
Site 8 GWTS Optimization

- **Redevelopment of 8-5149**
  - Best producer – accounts for bulk of flow
  - Went from 11 gpm bulk treatment to 23 gpm continuous
  - Increase frequency of change outs
  - Every 2 months to address biofouling

Surge tool for well development



Site 8 GWTS Performance



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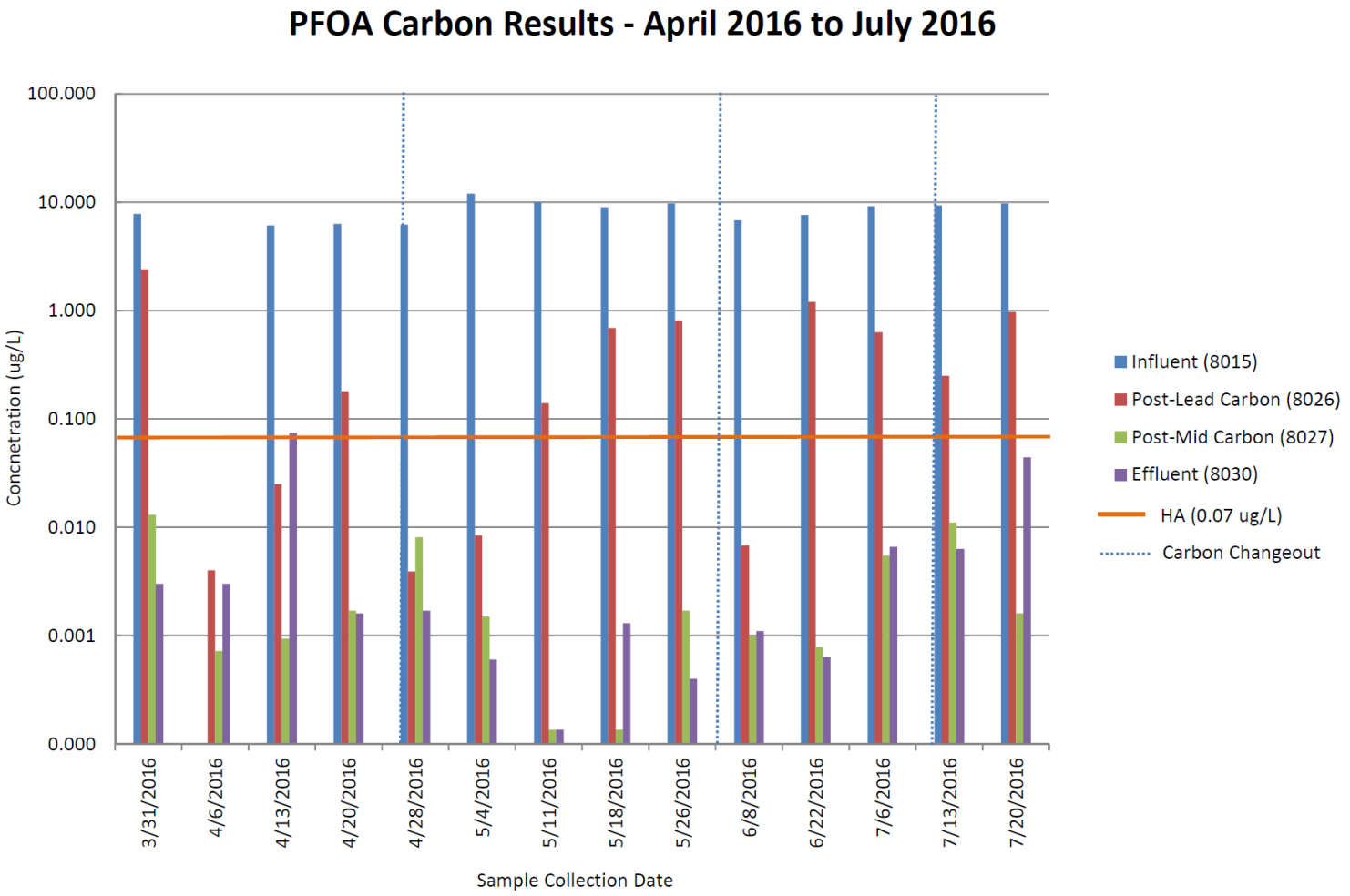

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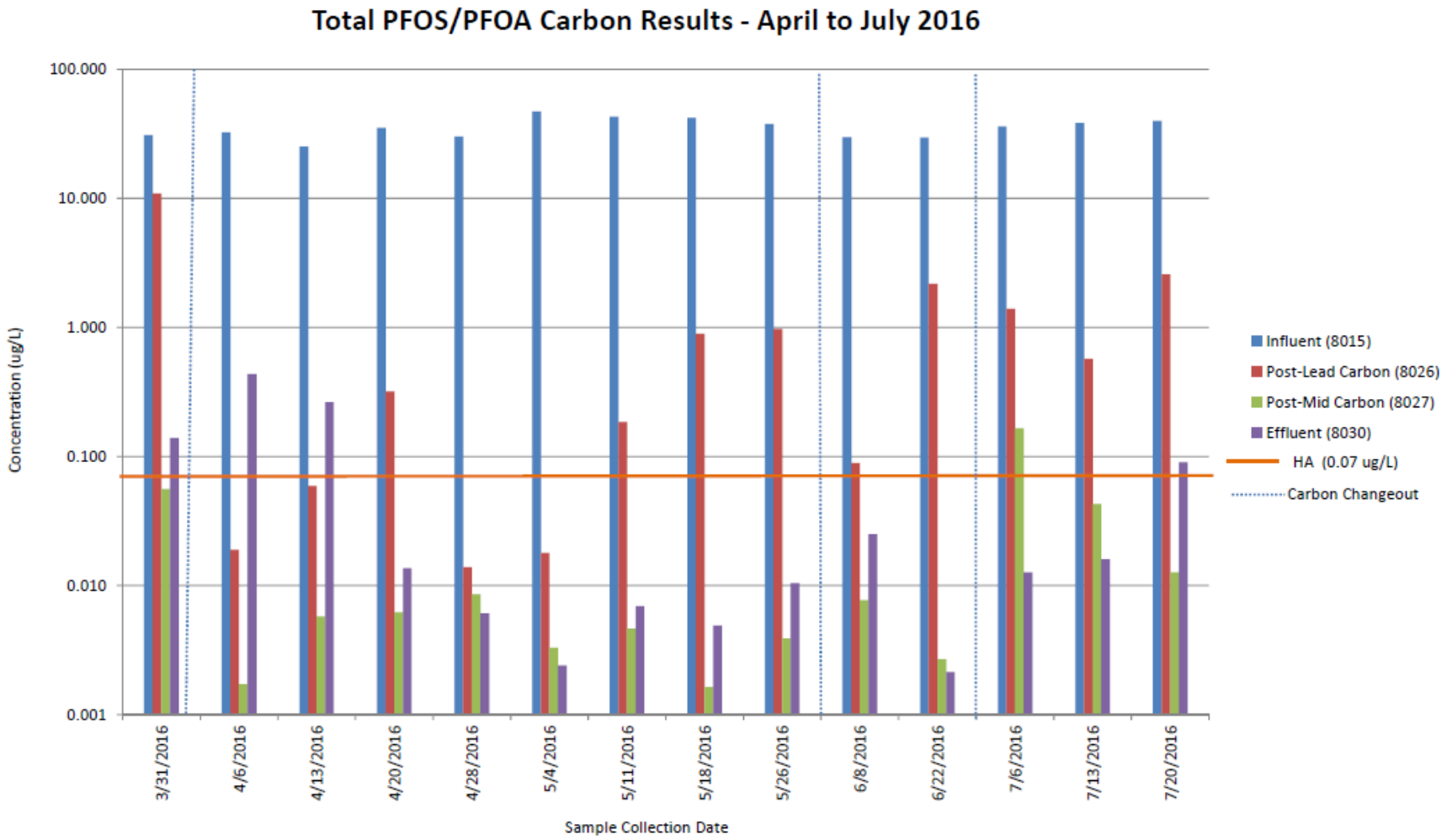

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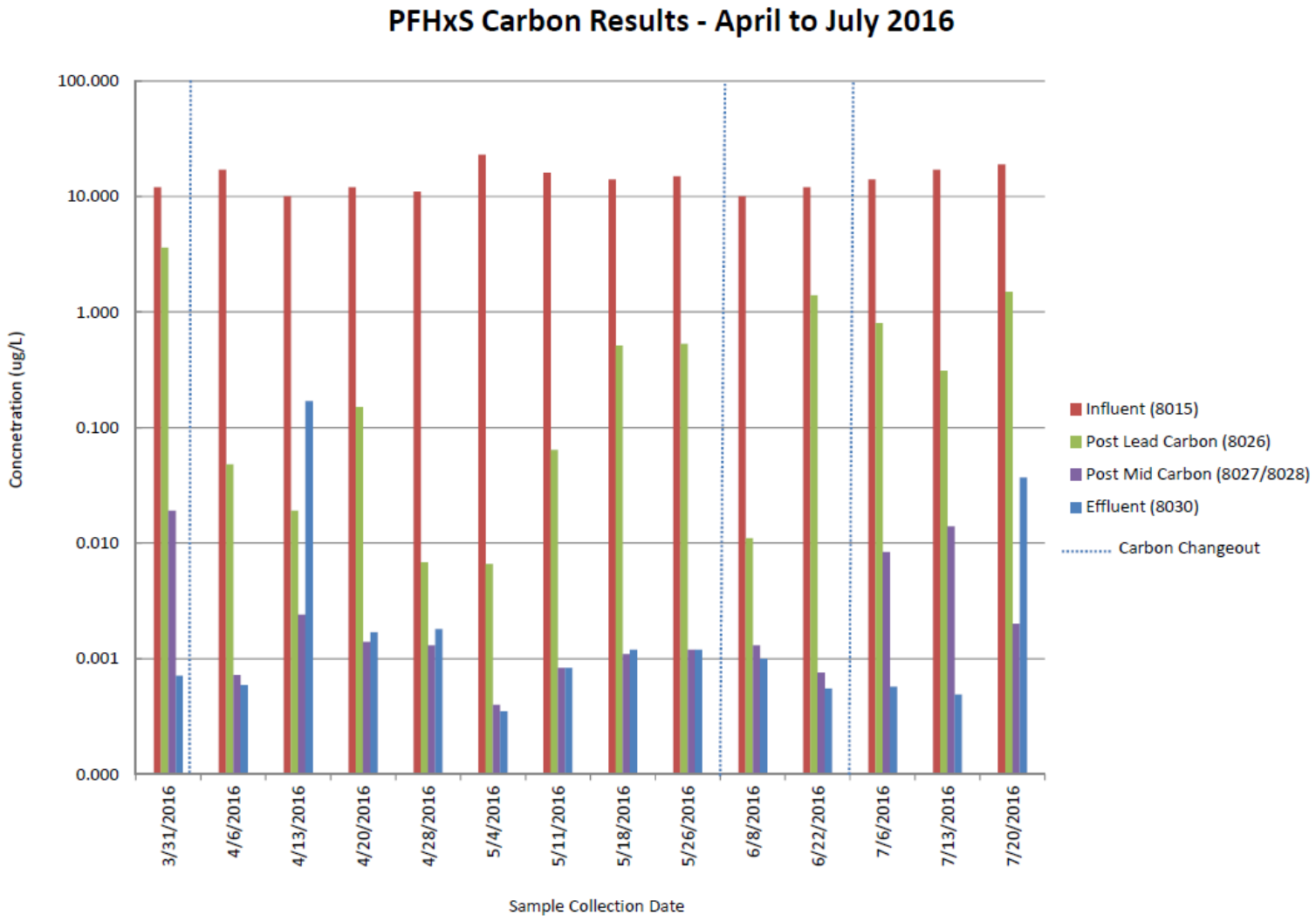

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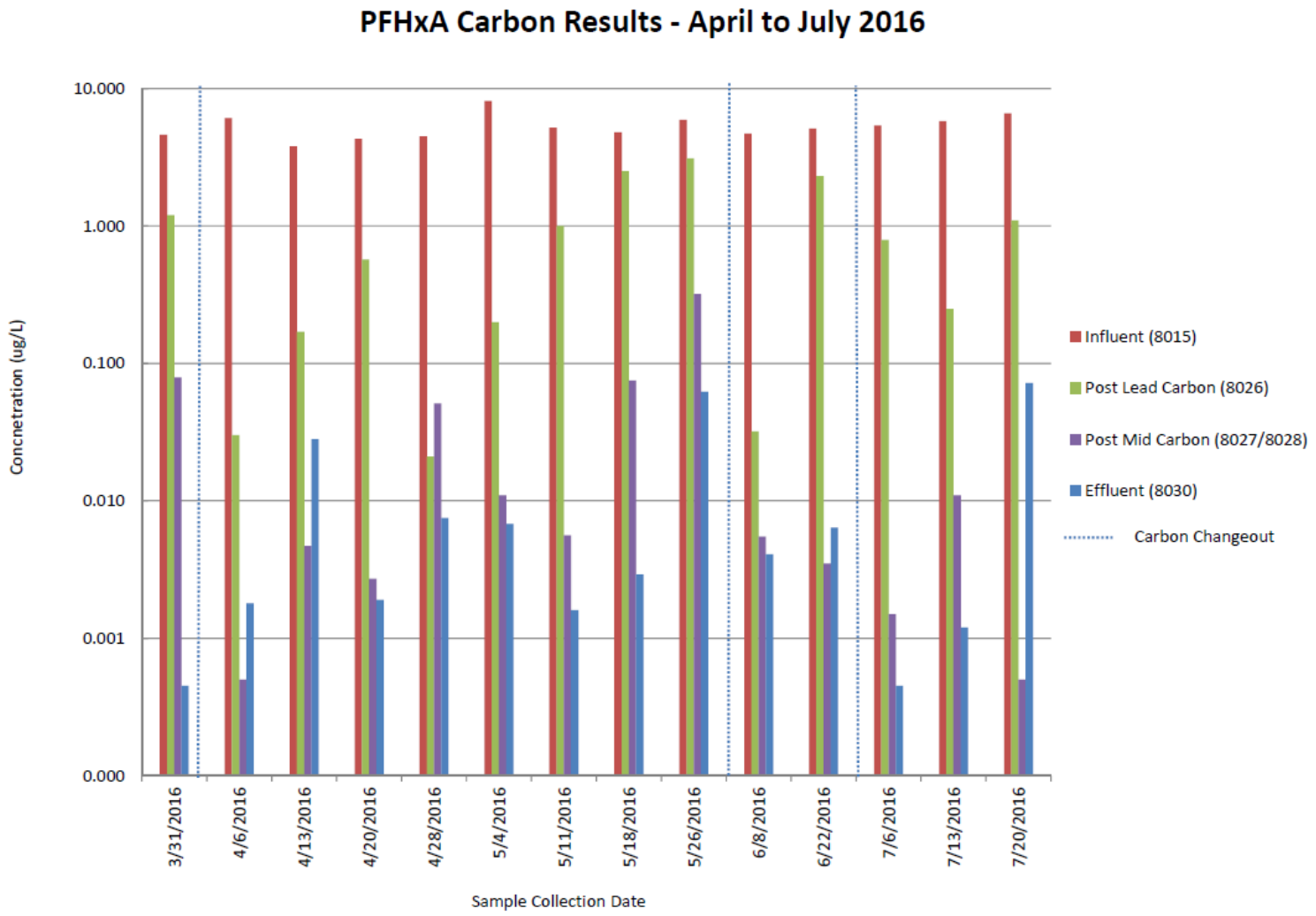

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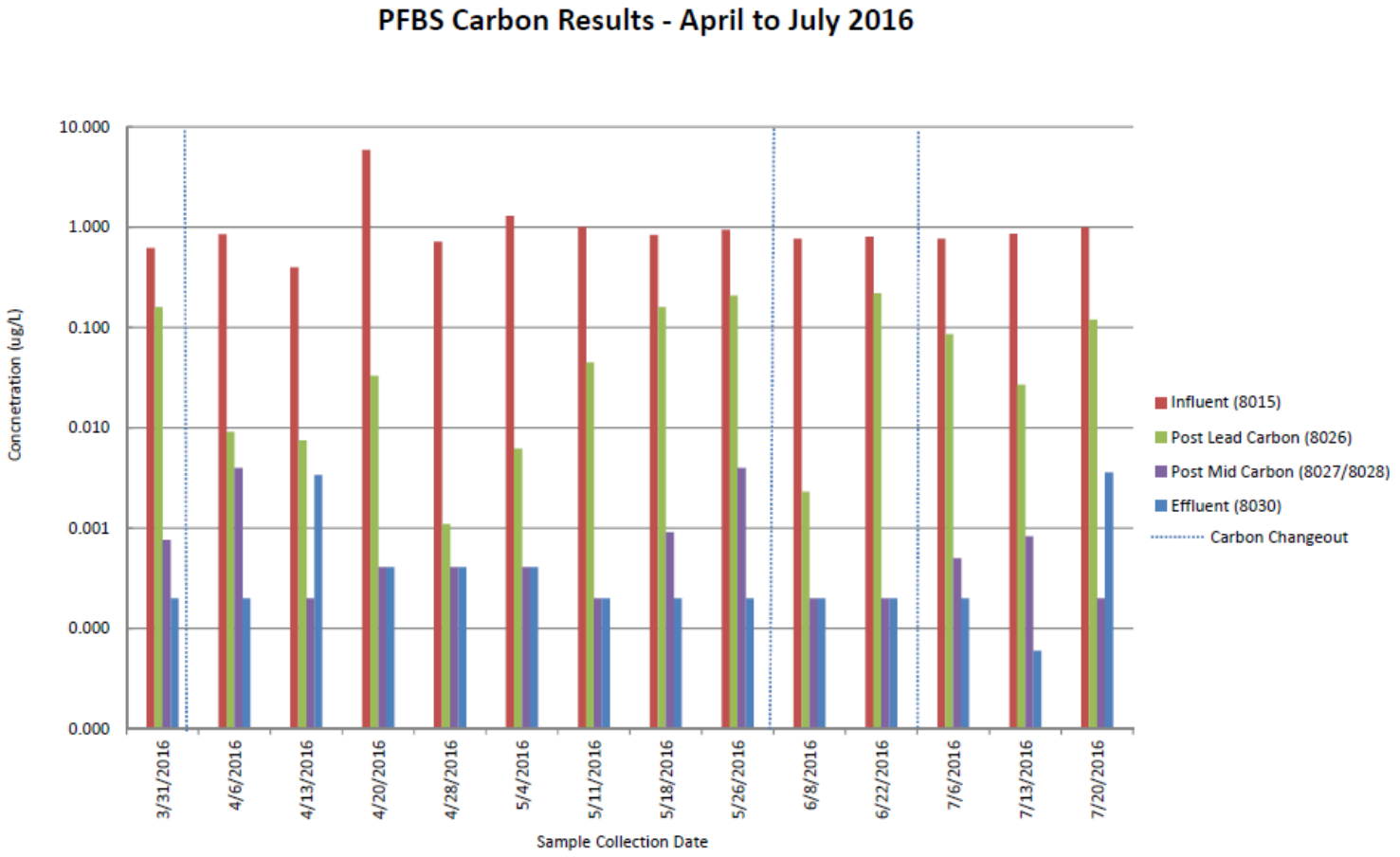

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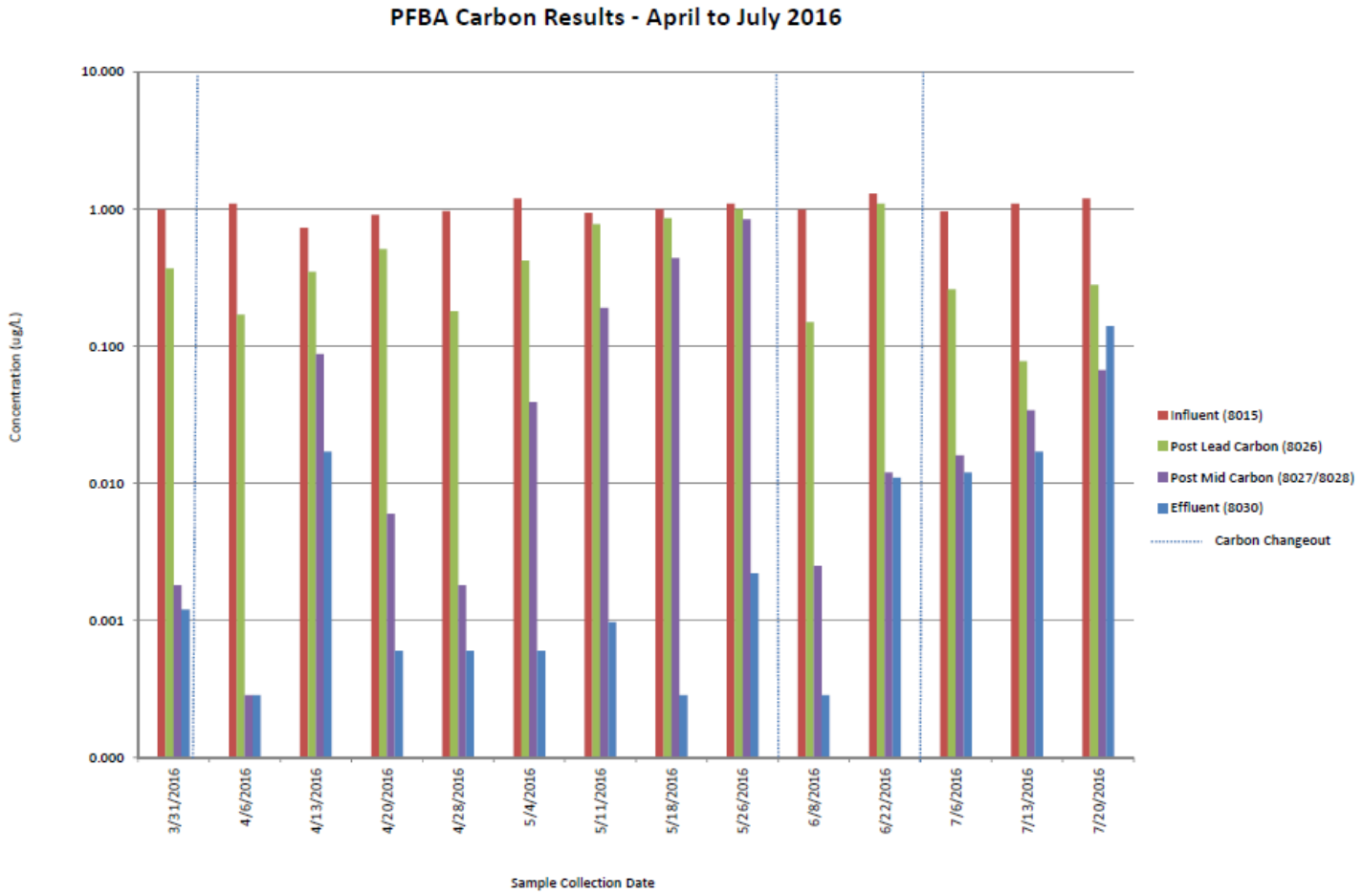


Update on PFCs at Pease

- **Site investigation reports for all identified AFFF use areas have been submitted**
- **Design of new treatment system at Fire Training Area is underway. Construction complete in fall 2017**
  - **17 new wells installed**
  - **4 pumping tests completed**
  - **Treatment technology pilot test complete**
- **Design of new treatment system to protect Haven, Smith, and Harrison Wells is underway. Construction complete in fall 2017**
  - **50 new hydraulic testing points installed**
  - **24 new wells installed**
  - **3 large-scale pumping tests are being performed this fall**

PFC Cleanup at Pease

- **Cleanup Challenges**
  - **Difficult to break C-F bonds**
  - **Very few examples of complete destruction**
  - **Beware of incomplete destruction**
  - **Successful technologies to date involve binding and separating the PFCs**
  - **Emergency response is the driver so far**
    - Protect drinking water
- **<u>Proven</u> treatment options are limited**

PFC Cleanup at Pease

- **Soil**
  - **Excavation and encapsulation**
  - **Incineration / thermal destruction**
  - **Mixing/Binding**

- **Groundwater**
  - **Adsorption**
  - **Flocculation**
  - **Membrane filtration**
  - **Chemical oxidization**

To date, granular activated carbon (GAC) is the proven technology that has been deployed for large-scale response

PFC Cleanup at Pease

Ion Exchange Resin Pilot Test

- **Air Force initiative to explore alternative treatment technologies**
  - **Several have shown ability to remove high levels of PFCs, but not to HA levels**
    - 171 ppb PFOS+PFOA → 6 ppb PFOS+PFOA
  - **Some can remove very low concentrations (less than 1 ppb) to PHA/HA levels**
  - **Few have shown the ability to do both**
- **Bench testing of an ion exchange resin indicated**
  - **Removal of PFCs to below detection limits (~ 6 ppt)**
  - **No breakthrough observed**
  - **>99% regeneration of media with solvent**

PFC Cleanup at Pease

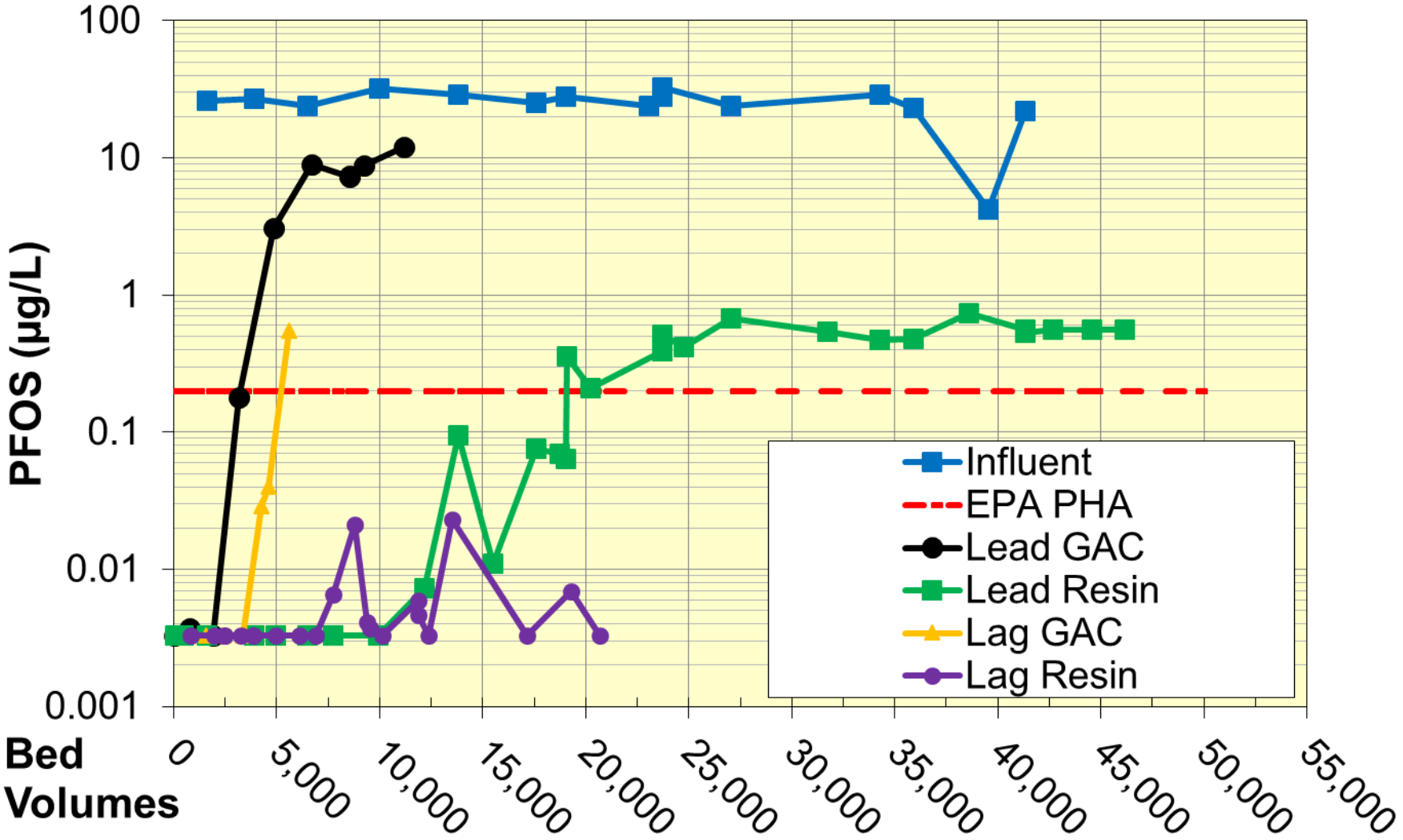
Ion Exchange Resin Pilot Test

Bench Scale Testing
(in the Laboratory)

Pilot Scale Testing
(at the Fire Training Area)

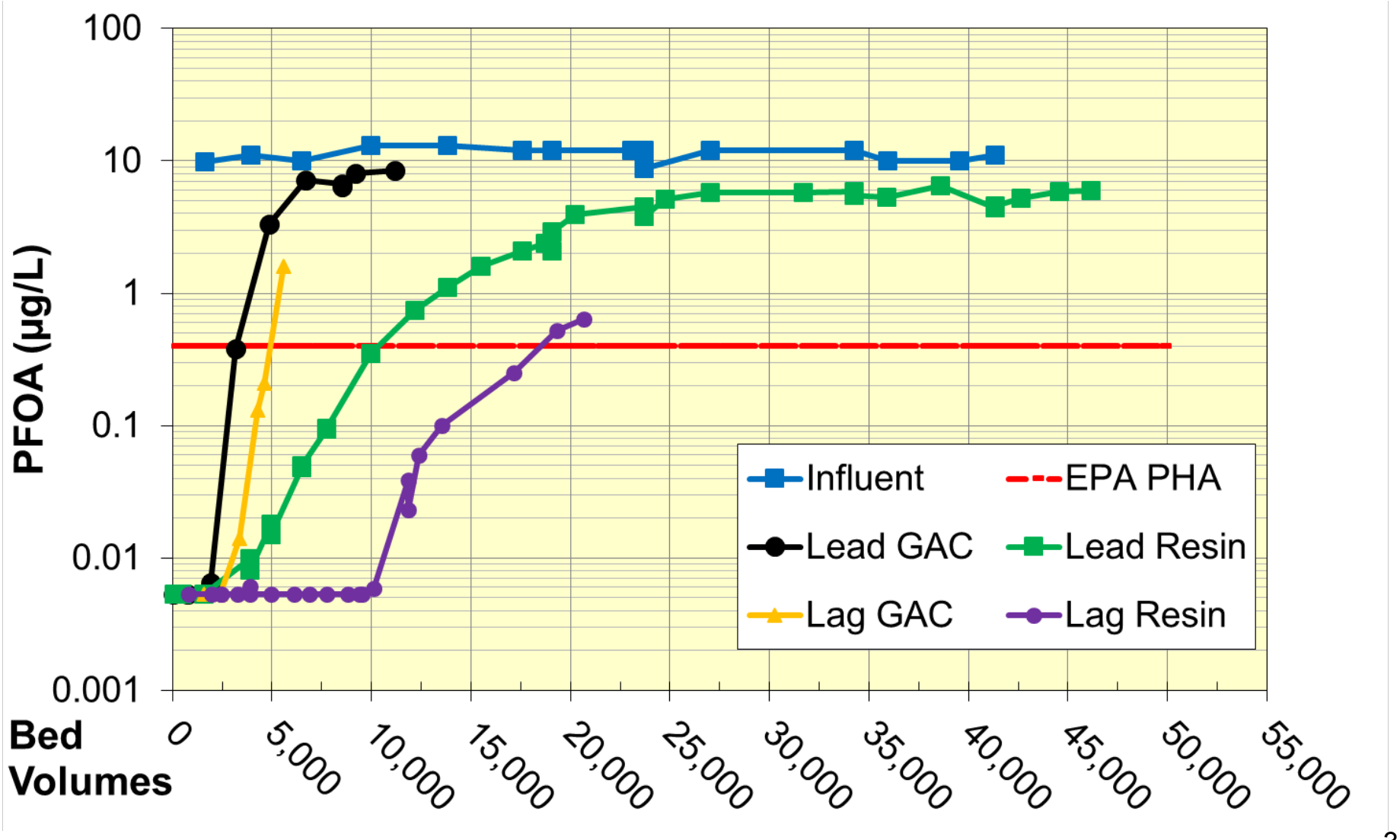
PFC Cleanup at Pease

Ion Exchange Resin Pilot Test



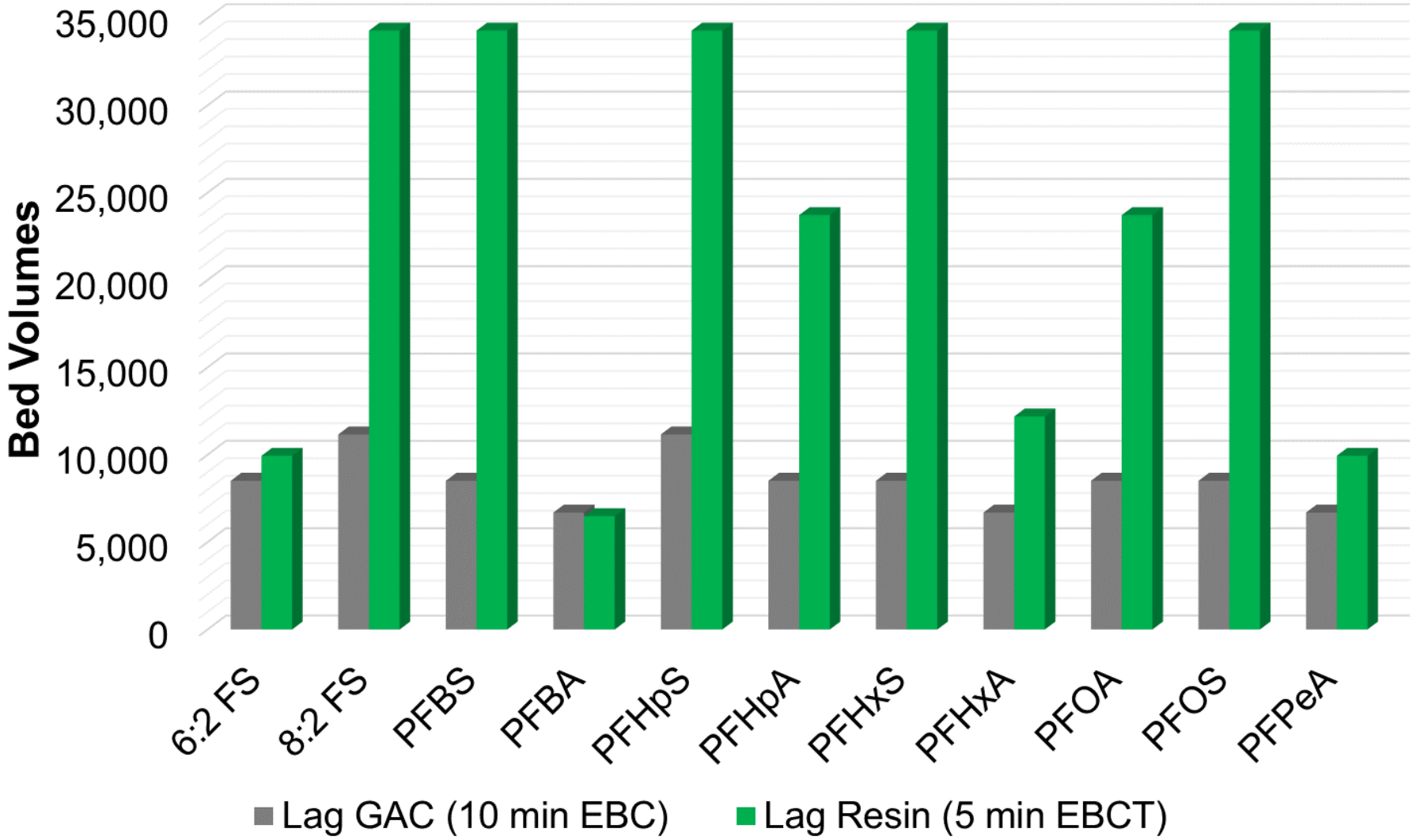
PFC Cleanup at Pease

Ion Exchange Resin Pilot Test



PFC Cleanup at Pease

Ion Exchange Resin Pilot Test



PFC Cleanup at Pease

Ion Exchange Resin Pilot Test

- Resin demonstrated superior longevity to GAC, especially at removing sulfonic acids
- Resin has a greater capacity than GAC, with smaller vessels
- Resin demonstrated comparable or better performance than GAC at removing branched and shorter chain PFCs
- The resin was successfully regenerated
- Waste minimization opportunities
- Lower life cycle costs over GAC systems for PFAS treatment
- Some applications may allow for disposal media

RAB Discussion

Questions?

Public Comment

Goal: Provide opportunity for members of the public to comment.

Process: Public members fill out a comment card indicating they wish to speak. Statements are timed and are limited to 3 minutes for each speaker. The timer will notify the speaker when they have 30 seconds remaining and when they have reached 3 minutes.

Outcome: Questions will be answered in writing in Meeting Minutes and individually, if you leave us an email address

RAB Operating Instructions

- **Facilitator-lead discussion**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